Introduction of

IBEX (Battery Quality, SOH, Tester)
iPQMS/BDS (Battery Diagnosis System)

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   (Including BDS/pro)

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1. POWERTRON Technical experience & History

POWERTRON has been manufactured "Automatic Chargers and Parts, Battery Portable Tester and Battery Monitoring System" since 1984.

- Jan. 1984: Established.
- Jan. 1992: Exported "Automatic Charger" to Japan & Taiwan.
- Dec. 1994: Developed Current Transducer (4,000A) for Seoul Subway.
- Feb. 1996: Exported "components of Automatic Charger" to Japan.
- Jun. 1999: Developed "Q-class DC Power/S" for Nuclear Power Plant.
- Nov. 2000: Began to R&D for Battery Diagnosis algorism (KT sponsored).
- Aug. 2004: Developed "Newest Technology for Batteries Diagnosis".
- **Sep. 2004: Certified "Newest Technology of Ripple rejection Algorithm" from Korean Government.**
- **May. 2005: Registered "3 or more -Patents" by Korean Intellectual Property Office, and supplied "Battery Portable Tester" to local major customer (KT Telecom, KEPCO Electric, Gas, Airport, and etc)**
- **Jun. 2005: Registered 2 PCT patents, in USA, Canada, Japan etc.**
- **Nov. 2006: Exported "Battery Portable Tester" to U.S, China, Brazil, etc**

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2. What is the IBEX?

- **IBEX** is a cutting edge digital battery diagnostic tester meeting all IEEE Std. recommendations for all stationary applications such as telecommunications back up power, utility switching power, uninterruptible power systems (UPS) and more.
- **IBEX** is the only diagnostic tester to measure the accurate internal ohmic Resistance (R), or conductance (Siemens), Jar voltage (V) and Jar temperature(°C/°F) utilizing the world's first ripple-removing algorithm within a very short time under floating charge or off line condition.
- **IBEX** is the only internal ohmic measurement tester in the market today providing results by using less than1~2 amps AC testing current for all types of batteries. That results in no affects to any batteries to be aged by AC testing current .
- World first technology owned by POWERTRON allows **IBEX/BDS** to accurately calculate internal ohmic resistance/ Conductance to maintain reading accuracy.**(Patents applied in US etc.)**

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(1) IBEX Strengths

- IBEX tests in less than 4 seconds.
- IBEX measuring Data are same in both case (on line or off line).
- IBEX is compact & lightweight (fits in the palm of your hand).
- IBEX measures data of batteries in 15 different types of banks.
- IBEX uses a Li-ion battery for maximum usage time (over 10 hours).
- IBEX meets all IEEE Std. recommendations for all Stationary Battery Systems.
- IBEX trends battery measurement data to detect impeding battery failures before a power backup system is affected.
- IBEX offers the most comprehensive diagnosis and reporting software package (Exmons Pro 2005, or 2008).
- IBEX Software (Exmons Pro 2005 or 2008) allows user to view battery health (aging status) in graphs, export to excel, and or provide information and 3D graphs in a report with the click of your mouse.
- IBEX Exmons Pro 2008 supports you multi-user environment.

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(2) IBEX utilize a patented Ripple-Removing Algorithm

- The patent for "Ripple-Removing Algorithm" applied to IBEX for analyzing the effective RMS voltage immunized against mixed ripple noise on charging, was registered as Korea Patent No.0494489 on Jun.05, 2005, and this patent (PTC) filed also to USA, Canada, Japan, China, and India.

- The Internal Ohmic measurement can be done with connecting a load or on charging by the "Ripple-Removing Algorithm", therefore the merged data by IBEX is very accuracy and no deviation on float charging conditions.
- So IBEX is superior to other testers.

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Powertron registered a patent PCT on 16 June, 2005

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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International Bureau

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PCT

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1 December 2004 (01.12.2004) KR

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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

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Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: BATTERY CELL VOLTAGE AND IMPEDANCE MEASURING CIRCUIT

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New Excellent Technology

(3-1) IEEE Std.1188-1996

Battery's Internal Ohmic Measurement

1) Impedance measurements can be performed by passing a current of known frequency and amplitude through the battery and measuring the resultant ac voltage drop across each cell/unit. The ac voltage measurement is taken between the positive and negative terminals of individual cells or the smallest group of cells possible. Compute the resultant impedance using Ohm's law.

2) Conductance measurements can be performed by applying a voltage of known frequency and amplitude across a cell/unit and observing the ac current that flows in response to it. The conductance is the ratio of the ac current component that is in-phase with the ac voltage, to the amplitude of the ac voltage producing it.

3) Resistance measurements can be performed by applying a load across the cell/unit and measuring the step change in voltage and current. The ohmic value is calculated by dividing the change in voltage by the change in current.

In the absence of specific guidelines from the instrument manufacturer, changes in ohmic values in excess of 20% should be considered significant. Such changes should be discussed with the battery manufacturer. In the absence of consultation with the battery manufacturer, a performance test should be run to determine the reliability of the battery system.

Significant changes in the values typically indicate a significant change in the cell, which may be reflected in its performance. However, limited changes in the specific values obtained do not necessarily indicate that the cell is free of defect or deterioration.

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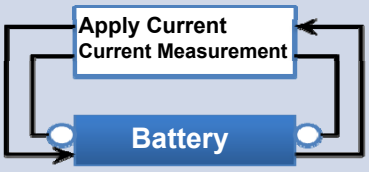
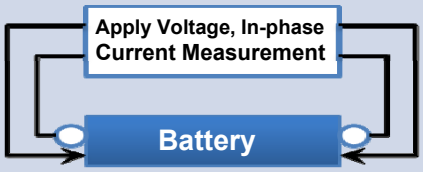
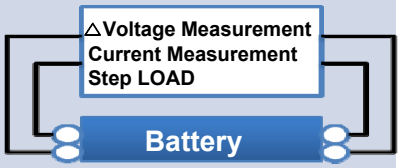
(3-2) Measurement technology

❖ **Recommended technology of battery aging status measurement by IEEE 1188-1996**

	IMPEDANCE TEST	CONDUCTANCE TEST	RESISTANCE TEST
Structure			
Formula	Impedance= $\frac{\text{Sense voltage(V)}}{\text{Test Current(I)}}$	Conductive Resistance = $\frac{\text{Test voltage(V)}}{\text{sense Current(I)}} \times \cos\theta$	Resistance = $\frac{\text{Differences voltage}(\triangle)}{\text{test DC Current(I)}}$

1. **By applying a AC current to battery, and measuring resultant AC voltage drop. Compute the resultant "impedance" using "Ohm's law" → Not calculate cosθ**
2. **By applying a AC voltage to battery, and observing the AC current values. Compute the resultant "Conductance(S)" by "Ohm's law" → calculate cosθ**
3. **By applying a load across the cell/unit and measuring the step change in voltage and current(Vdt/Tdt), calculate "Resistance".**

Remarks; Difference between method 1 and 2 is that whether they are considered with cosθ of AC current in-phase, or not.

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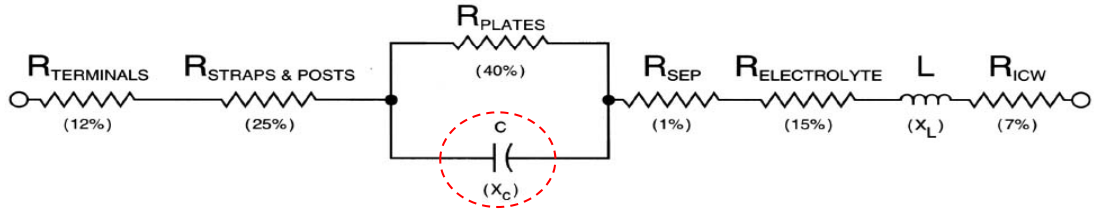
(3-3) IBEX or BDS measure internal ohmic resistance except capacitance

- Following is Battery Equivalent Circuit. In IEEE Std.1188-1996, Internal Ohmic Measurements can be performed passing a current and measuring the resultant ac voltage across cell, and the internal Ohmic Resistance/conductance is computed by using AC ohm's law.



Conventional Impedance Tester can measure total Impedance including Xc (capacitance) and this impedance measuring is unrelated to battery surfation or aging.

- Xc (capacitance) is varied by testing current frequency.
- But, IBEX/BDS can measure only internal ohmic resistance except for Xc capacitance, the reason why IBEX can compute the ratios of AC impedance voltage that is in-phase with AC current by IEEE recommendation.

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(4) Specification and Characteristics for IBEX

Items	IBEX-1000	IBEX-PRO	IBEX-Ultra
■ Data Storage	600	600	4,800
■ Measuring Items Cell Voltage Cell Resistance Interconnect Resistance Temperature on (-) terminal % Ripple Current, FFT Analysis	 0.1Vdc ~60.0Vdc 3/30/300mΩ(auto) 3/30/300mΩ(auto) -20℃ ~ +80℃ N/A	 0.1Vdc ~60.0Vdc 3/30/300mΩ(auto) 3/30/300mΩ(auto) -20℃ ~ +80℃ N/A	0.1Vdc ~60.0Vdc 3/30/300mΩ(auto) 3/30/300mΩ(auto) -20℃ ~ +80℃ Available Ripple % with connected DC Clamp Meter.
■ Capacity Range	5AH~6,000AH		
■ Accuracy: Voltage, Temp. Resistance/ Siemens	±0.5% class, ±2.0 class (-20℃ ~ +80℃) ±1.0 % rdg. ±8 dgt. (3milli ohm full-scale) across test range		
■ Resolution: Voltage, Temp. Resistance,	10mV, 0.5℃, 0.001mΩ		
■ Measuring mode, speed/ cell	**Normal** (less than 4 seconds for measurement), **Fine** and **Automatic**		
■ Download and Analysis S/W	■ **SerialComm** (download and Excel file conversion S/W) ■ **Exmons Pro 2005/2008** (Integrated Diagnosis S/W Stationary Application) Database construction and control by site, bank, cell 2D, 3D graph display of changes against basic values or by period Printing of data and analysis report including graph		
■ probe types (5)	① 4-Pin ② Clip ③ Clip with thermal sense ④ Mini-pin ⑤ Temperature		
■ Data Format	Excel 2000/ 2003, Windows 98/ 2000/ XP/ Vista compatible		
■ Build-in Battery	1,950mAh, 11.1V		
■ Wight, Exterior size (mm)	World first compact size 650g, 95W * 42D * 175H can fits in the palm of your hand		

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(5) IBEX-1000 (Economy) Item list

IBEX-1000 (Economy)	
US$ is distributor price.	
1	IBEX-1000 Body (no printable means)
2	Li-ion Battery inside Body
3	Soft Poly-Vinyl Bag
4	Standard Charger for Body, 100Vac to 240Vac
5	4-Pin type Probe
6	USB Cable to upload PC
7	Bundled Software : SerialComm
8	English User's Manual

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(6) IBEX-PRO (Standard) Item list

IBEX-PRO (Standard)	
US$ is distributor price.	
1	**IBEX-Pro Body with printable means**
2	Li-ion Battery inside body
3	**Soft Poly-Vinyl Bag with Zero Adjust Plate**
4	Standard Charger for Body, 100Vac to 240Vac
5	**4-Pin type Probe**
6	**Clip Type Probe**
7	**Temperature Probe**
8	English User's Manual
9	Bundled Software : SerialComm
10	USB Cable to upload PC
11	Diagnosis Software, Exmons Pro 2005
12	**Plastic Carrying Case(450×340×120)**
13	Shunt (50mV/5Q0A, 1mΩ, 1.0Class)
14	Spare 4-Pin Tip
15	Spare Li-ion Battery
16	**IR Thermal Printer**
17	Paper Roll for IR Thermal Printer
18	220V AC Standard Charger for IR Thermal Printer
19	Spare Paper Roll for IR Thermal Printer

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(7) IBEX-Ultra Item list

IBEX-Ultra	
US$ for distributor price.	
1	**IBEX-Ultra Body with printable means**
2	Li-ion Battery inside body
3	**Soft Poly-Vinyl Bag with Zero Adjust Plate**
4	Standard Charger for Body, 100Vac to 240Vac
5	**4-Pin type Probe**
6	**Clip Type Probe**
7	**Temperature Probe**
8	English User's Manual
9	Bundled Software : SerialComm
10	USB Cable to upload PC
11	Diagnosis Software, Exmons Pro 2008
12	**Plastic Carrying Case (450×340×120)**
13	Shunt (50mV/5Q0A, 1mΩ, 1.0Class)
14	Spare 4-Pin Tip
15	Spare Li-ion Battery
16	**IR Thermal Printer**
17	Paper Roll for IR Thermal Printer
18	220V AC Standard Charger for IR Thermal Printer
19	Spare Paper Roll for IR Thermal Printer
20	**DC Clamp Meter to measure a ripple current %**

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(7-1) IBEX-Ultra Strength

❖ **Exmons Pro 2008** supports a multi-user environment in data management.

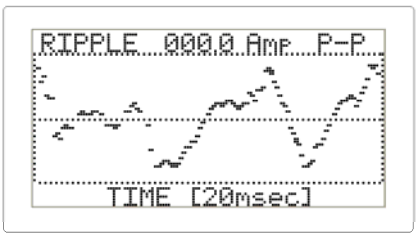
❖ Possible to analyzing Content Percentage (%) of Charging Ripple Current.

❖ Data Storage

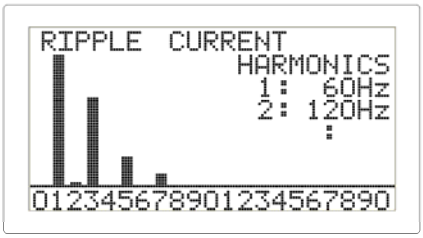
Model	IBEX-1000, PRO	IBEX-Ultra
Data Storage	600cells Max.	4,800cells Max.

❖Alarm Setting Files

Model	IBEX-1000, PRO	IBEX-Ultra
Alarm Setting Files	4	80



[RIPPLE WAVEFORM]



[RIPPLE FFT]

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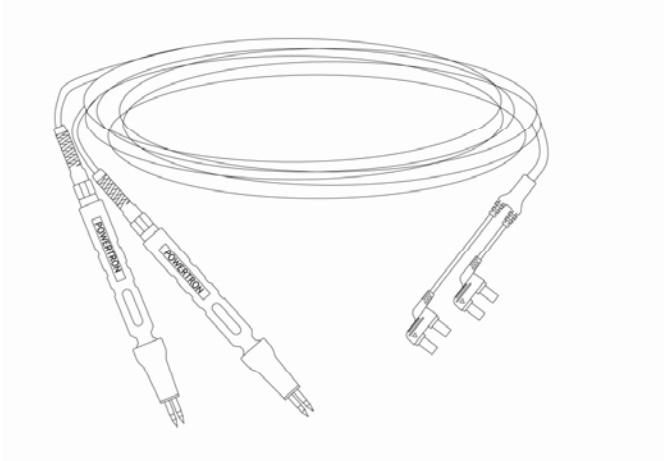
2-1. Accessories
(1) Accessories drawing



4-Pin type Probe

(Included in Economy, PRO, Ultra model)

Temperature Probe

(Included in PRO, Ultra model)

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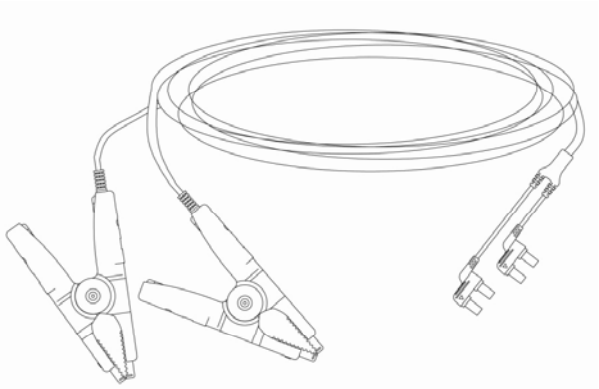
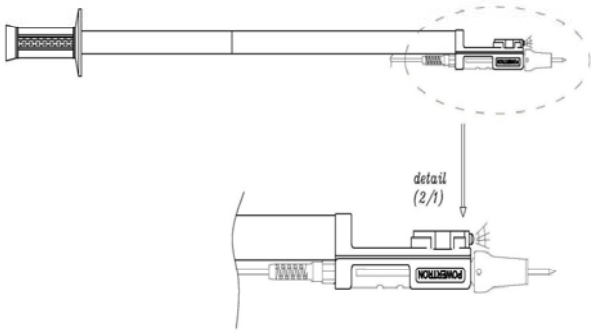
(2) Accessories drawing



Clip type Probe
(Included in PRO, Ultra model)



Probe Extension for inside cabinet battery testing.
(additional price item)

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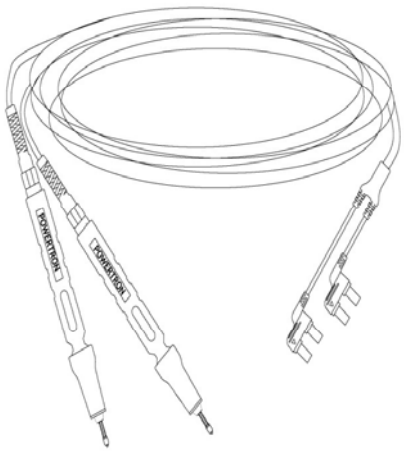
(3) Accessories drawing

Clip with Temperature sensor type Probe
(additional price item)



Mini-pin type Probe
(additional price item)

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(4) Accessories drawing

IR Thermal Printer

Charing adopter Thermal Printer

Shunt (50mV/50A, 1mΩ)
for simplicity calibration

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(5) Accessories drawing

Spare Paper Roll

Spare 4-Pin Tip

Standard Charger for IBEX
Body, 100Vac~240Vac

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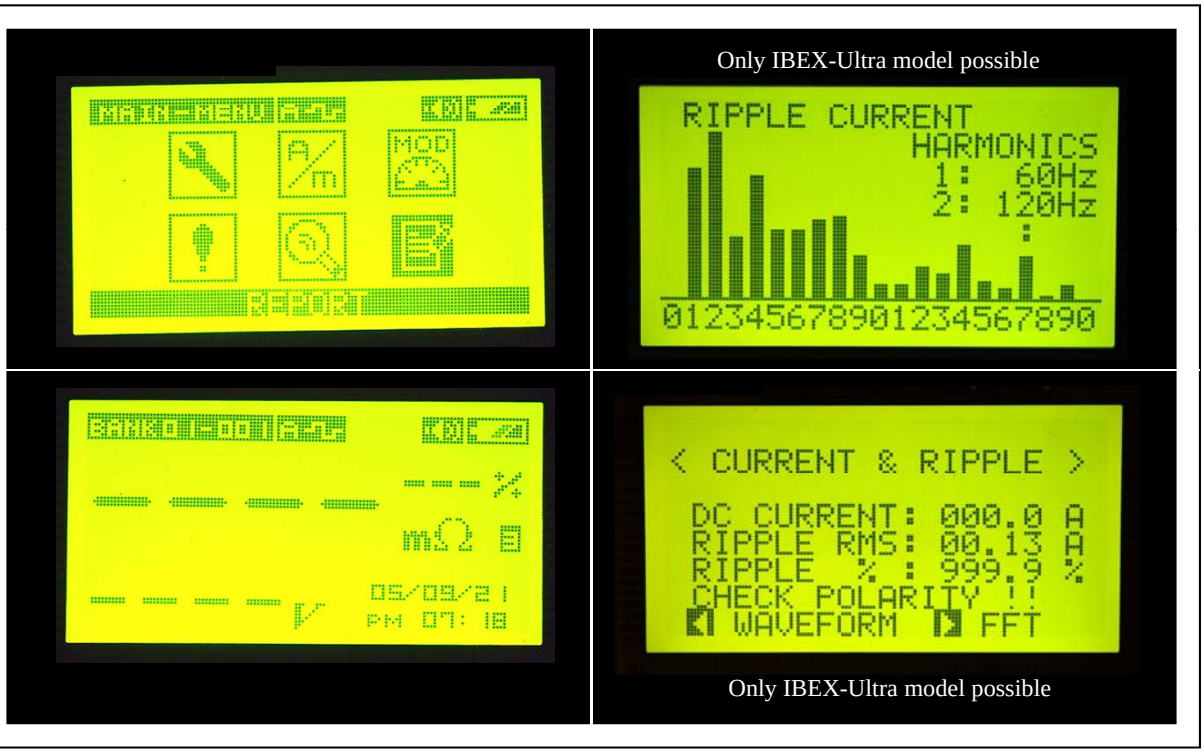
(6) LCD Display for 1000 /Ultra model



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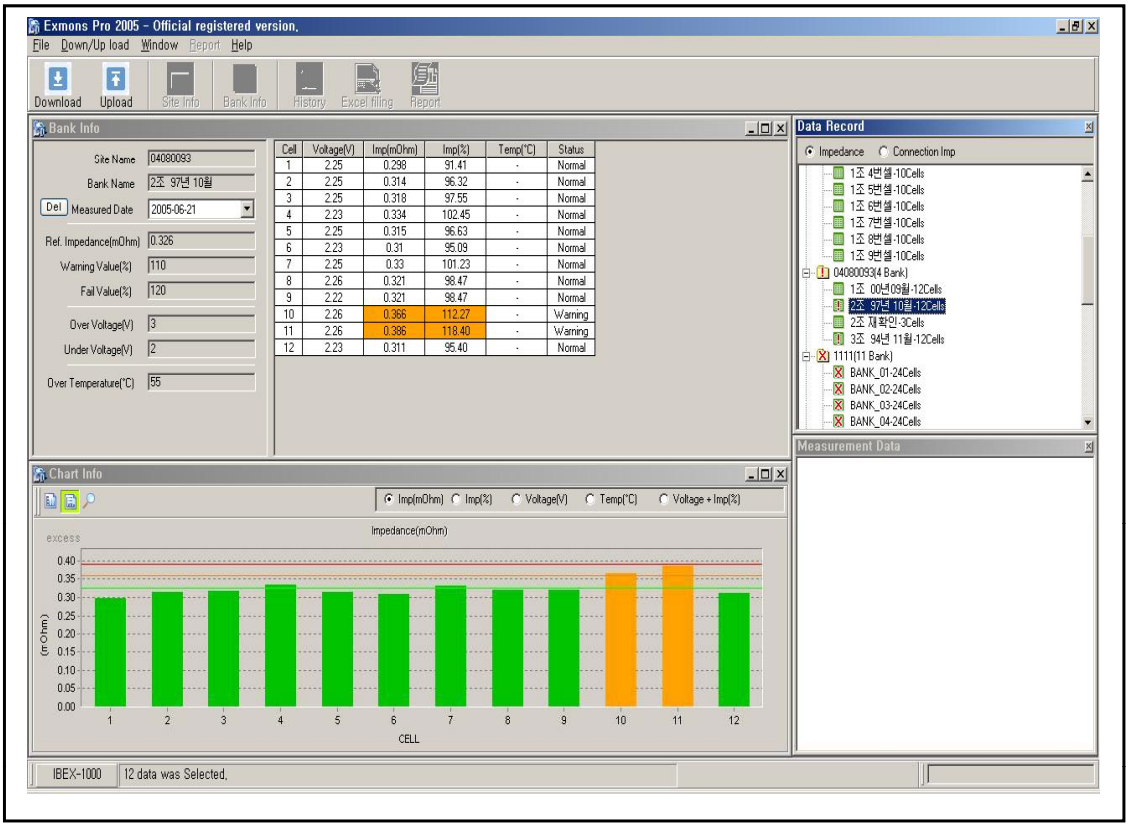
(7) Exmons Pro 2005



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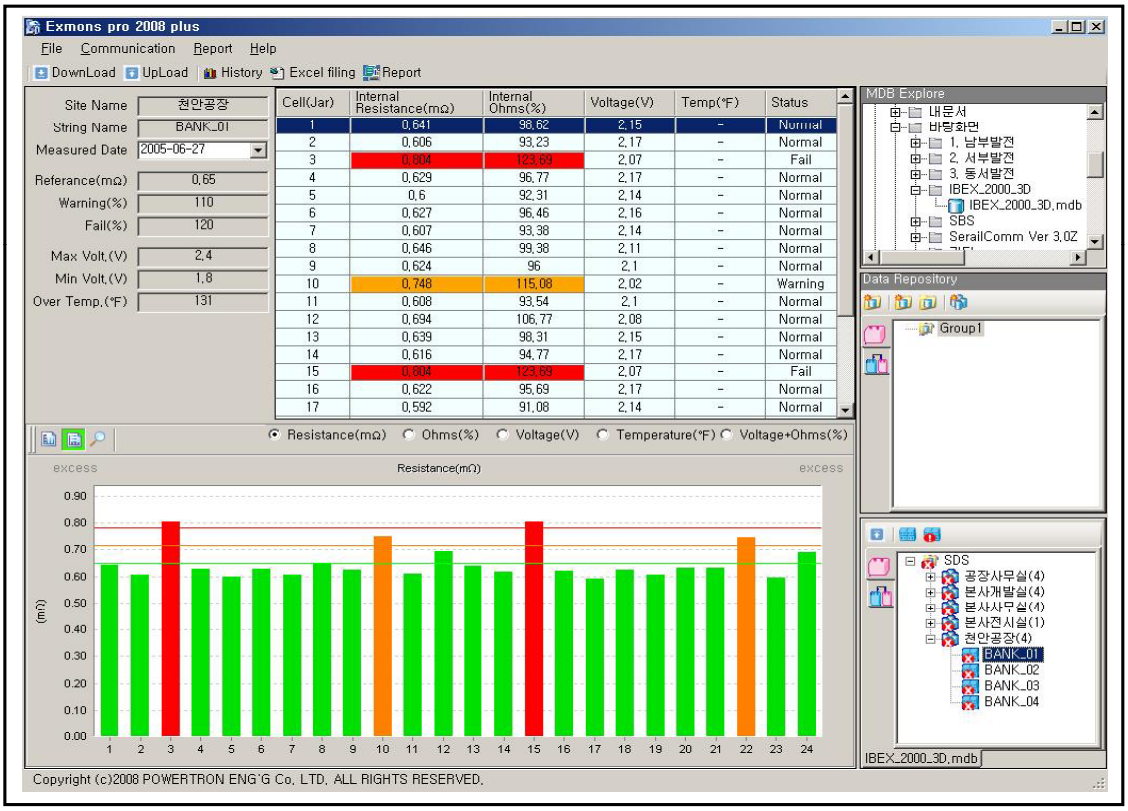
(8) Exmons Pro 2008

supports a multi-user environment in data management.


Exmons pro 2008 plus
File Communication Report Help
DownLoad UpLoad History Excel filing Report
Site Name 천안공장
String Name BANK_01
Measured Date 2005-06-27
Referance(mΩ) 0,65
Warning(%) 110
Fail(%) 120
Max Volt.(V) 2,4
Min Volt.(V) 1,8
Over Temp.(℉) 131
Cell(Jar) | Internal Resistance(mΩ) | Internal Ohms(%) | Voltage(V) | Temp(℉) | Status
1 | 0,641 | 98,62 | 2,15 | - | Normal
2 | 0,606 | 93,23 | 2,17 | - | Normal
3 | 0,804 | 123,69 | 2,07 | - | Fail
4 | 0,629 | 96,77 | 2,17 | - | Normal
5 | 0,6 | 92,31 | 2,14 | - | Normal
6 | 0,627 | 96,46 | 2,16 | - | Normal
7 | 0,607 | 93,38 | 2,14 | - | Normal
8 | 0,646 | 99,38 | 2,11 | - | Normal
9 | 0,624 | 96 | 2,1 | - | Normal
10 | 0,748 | 115,08 | 2,02 | - | Warning
11 | 0,608 | 93,54 | 2,1 | - | Normal
12 | 0,694 | 106,77 | 2,08 | - | Normal
13 | 0,639 | 98,31 | 2,15 | - | Normal
14 | 0,616 | 94,77 | 2,17 | - | Normal
15 | 0,804 | 123,69 | 2,07 | - | Fail
16 | 0,622 | 95,69 | 2,17 | - | Normal
17 | 0,592 | 91,08 | 2,14 | - | Normal
MDB Explore
내문서
바탕화면
1. 남부발전
2. 서부발전
3. 동서발전
IBEX_2000_3D
IBEX_2000_3D.mdb
SBS
SerailComm Ver 3.0Z
Data Repository
Group1
Resistance(mΩ) Ohms(%) Voltage(V) Temperature(℉) Voltage+Ohms(%)
excess
Resistance(mΩ)
excess
(mΩ)
SDS
공장사무실(4)
본사개발실(4)
본사사무실(4)
본사전시실(1)
천안공장(4)
BANK_01
BANK_02
BANK_03
BANK_04
IBEX_2000_3D.mdb
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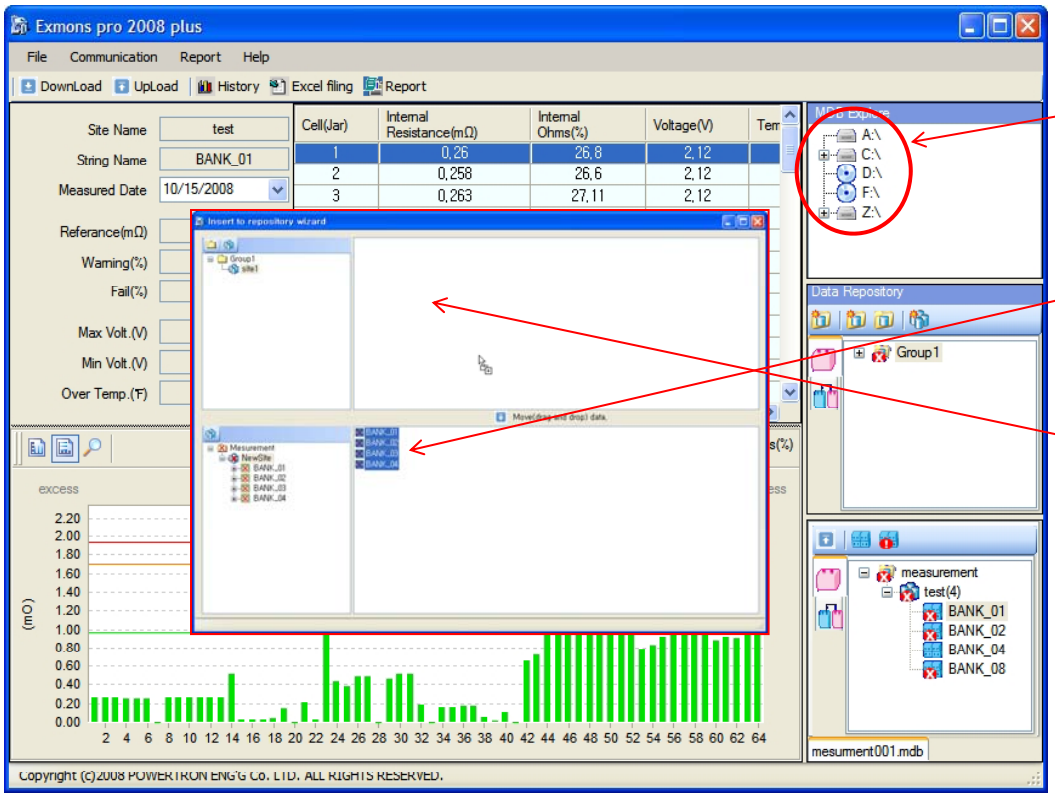
(8-1) Exmons Pro 2008 strength



1. Double-click 「mdb」 file by Searching it in MDB Explore. Then, you can see the data of selected 「mdb 」 file in lower window

This is user-friendly function for Multi-user Environment.

2. Please select Measurement Date nodes in the Data list of lower window.

3. Please drag and drop nodes to the site of Repository list in upper window for constructing database of measured data with Strings.

4. Measured data in the Data list of lower window can be added to the previous String in upper Repository Window, that is the same string can be managed by date in one String. Therefore, you can easily analyze the aging status by date order with 2D, 3D graph, measured data and etc.

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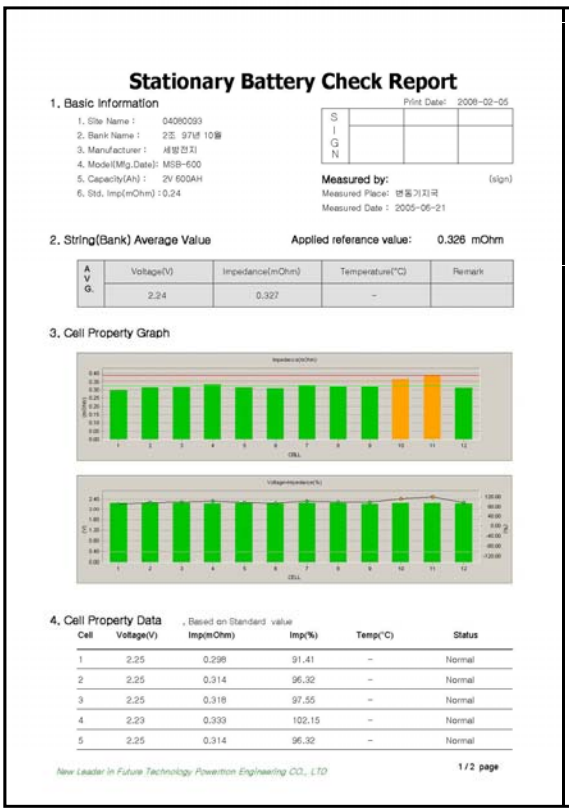
(9) Report Form / 3D Trend



Stationary Battery Check Report

1. Basic Information

Print Date: 2006-02-05

1. Site Name : 04060093
2. Bank Name : 2조 97년 10월
3. Manufacturer : 세방전지
4. Model(Mfg.Date): MSB-600
5. Capacity(Ah) : 2V 600AH
6. Std. Imp(mOhm) : 0.24

SIGN			

Measured by: (sign)
Measured Place: 변동기지국
Measured Date : 2005-06-21

2. String(Bank) Average Value Applied referance value: 0.326 mOhm

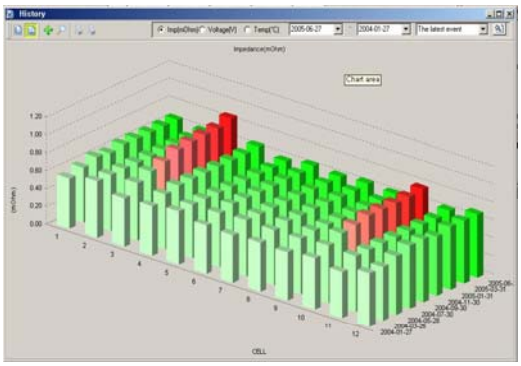
AVG.	Voltage(V)	Impedance(mOhm)	Temperature(°C)	Remark
	2.24	0.327	-	

3. Cell Property Graph

4. Cell Property Data , Based on Standard value

Cell	Voltage(V)	Imp(mOhm)	Imp(%)	Temp(°C)	Status
1	2.25	0.298	91.41	-	Normal
2	2.25	0.314	96.32	-	Normal
3	2.25	0.318	97.55	-	Normal
4	2.23	0.333	102.15	-	Normal
5	2.25	0.314	96.32	-	Normal

New Leader in Future Technology Powertron Engineering CO., LTD 1 / 2 page



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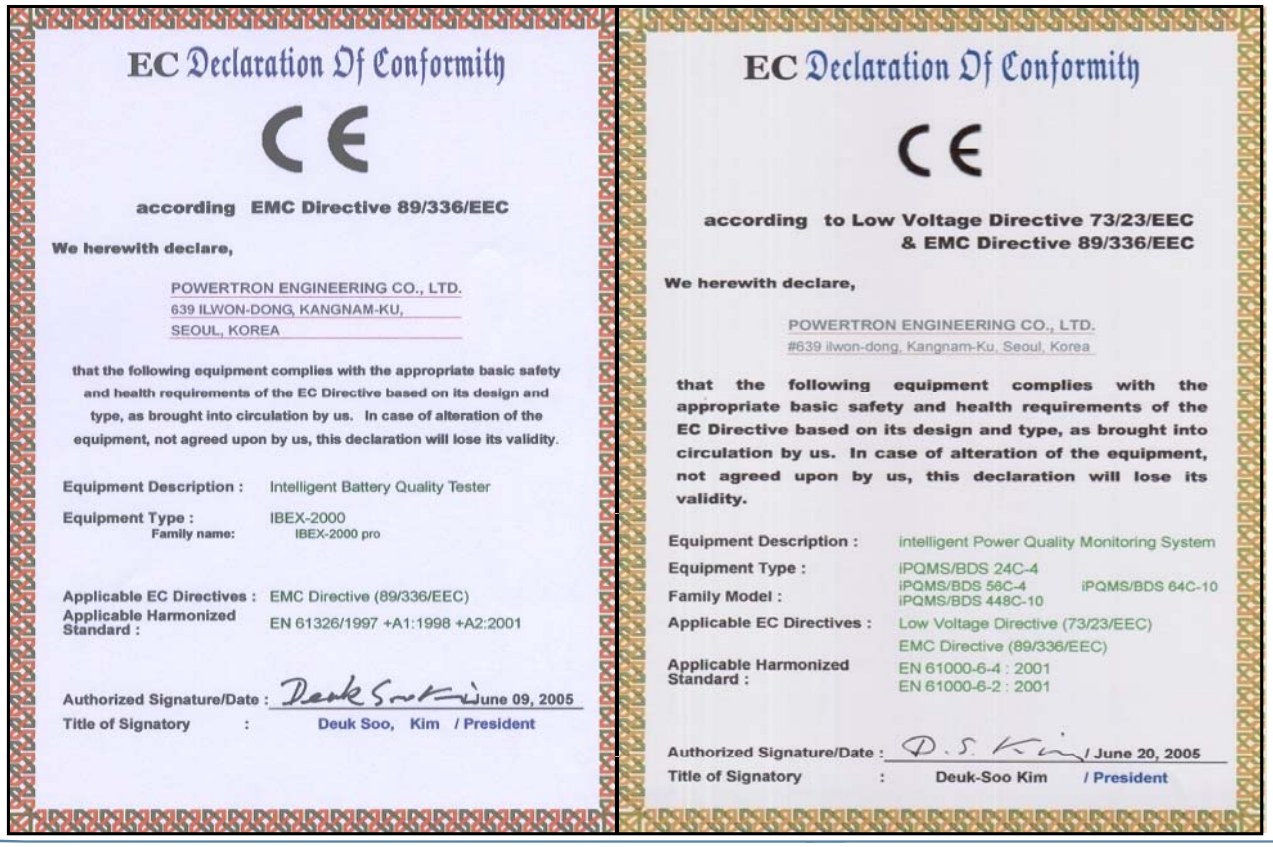
(10) CE Certificate



EC Declaration Of Conformity

CE

according EMC Directive 89/336/EEC

We herewith declare,

POWERTRON ENGINEERING CO., LTD.
639 ILWON-DONG, KANGNAM-KU,
SEOUL, KOREA

that the following equipment complies with the appropriate basic safety and health requirements of the EC Directive based on its design and type, as brought into circulation by us. In case of alteration of the equipment, not agreed upon by us, this declaration will lose its validity.

Equipment Description : Intelligent Battery Quality Tester

Equipment Type : IBEX-2000
Family name: IBEX-2000 pro

Applicable EC Directives : EMC Directive (89/336/EEC)
Applicable Harmonized Standard : EN 61326/1997 +A1:1998 +A2:2001

Authorized Signature/Date : June 09, 2005
Title of Signatory : Deuk Soo, Kim / President

EC Declaration Of Conformity

CE

according to Low Voltage Directive 73/23/EEC & EMC Directive 89/336/EEC

We herewith declare,

POWERTRON ENGINEERING CO., LTD.
#639 ilwon-dong, Kangnam-Ku, Seoul, Korea

that the following equipment complies with the appropriate basic safety and health requirements of the EC Directive based on its design and type, as brought into circulation by us. In case of alteration of the equipment, not agreed upon by us, this declaration will lose its validity.

Equipment Description : intelligent Power Quality Monitoring System
Equipment Type : iPQMS/BDS 24C-4
Family Model : iPQMS/BDS 56C-4 iPQMS/BDS 64C-10 iPQMS/BDS 448C-10
Applicable EC Directives : Low Voltage Directive (73/23/EEC) EMC Directive (89/336/EEC)
Applicable Harmonized Standard : EN 61000-6-4 : 2001 EN 61000-6-2 : 2001

Authorized Signature/Date : / June 20, 2005
Title of Signatory : Deuk-Soo Kim / President

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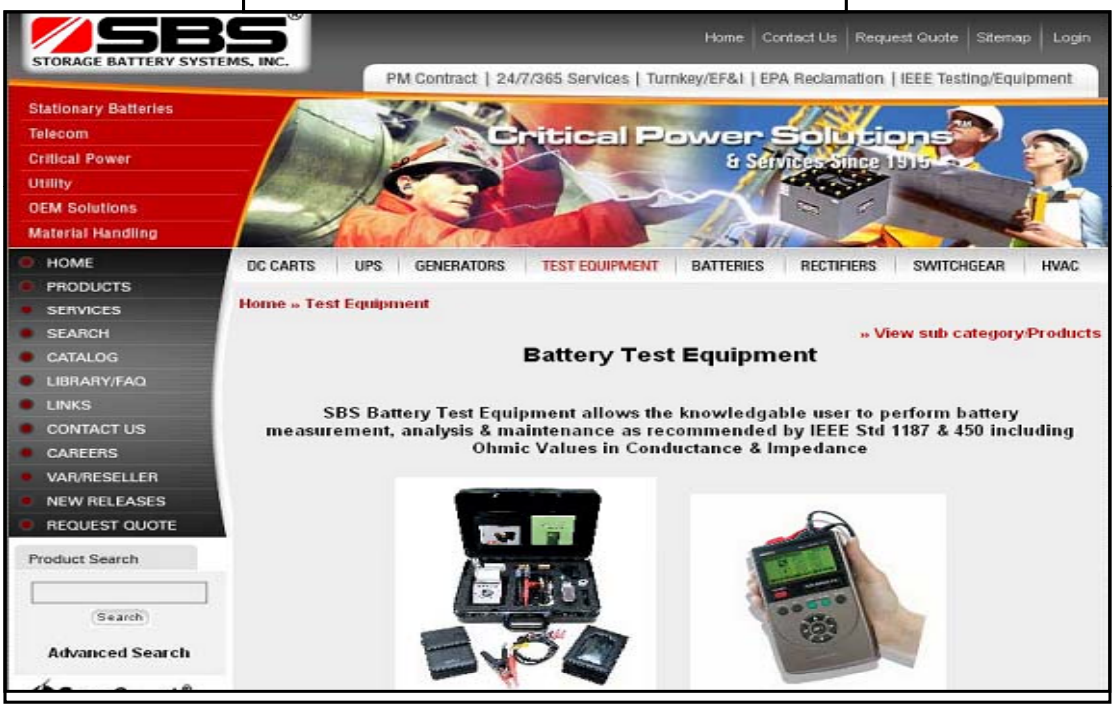
2-2. Sales Reference – USA(1)

An Exclusive dealer in USA

www.sbsbattery.com



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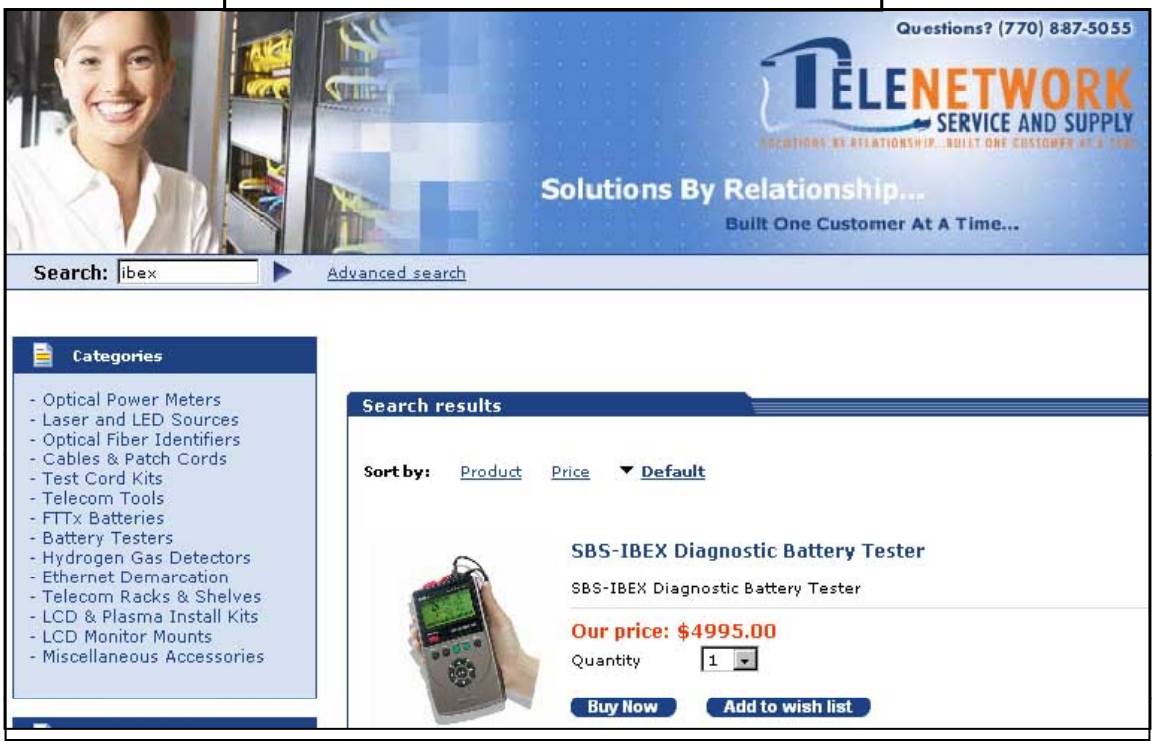
www.telsupply.com



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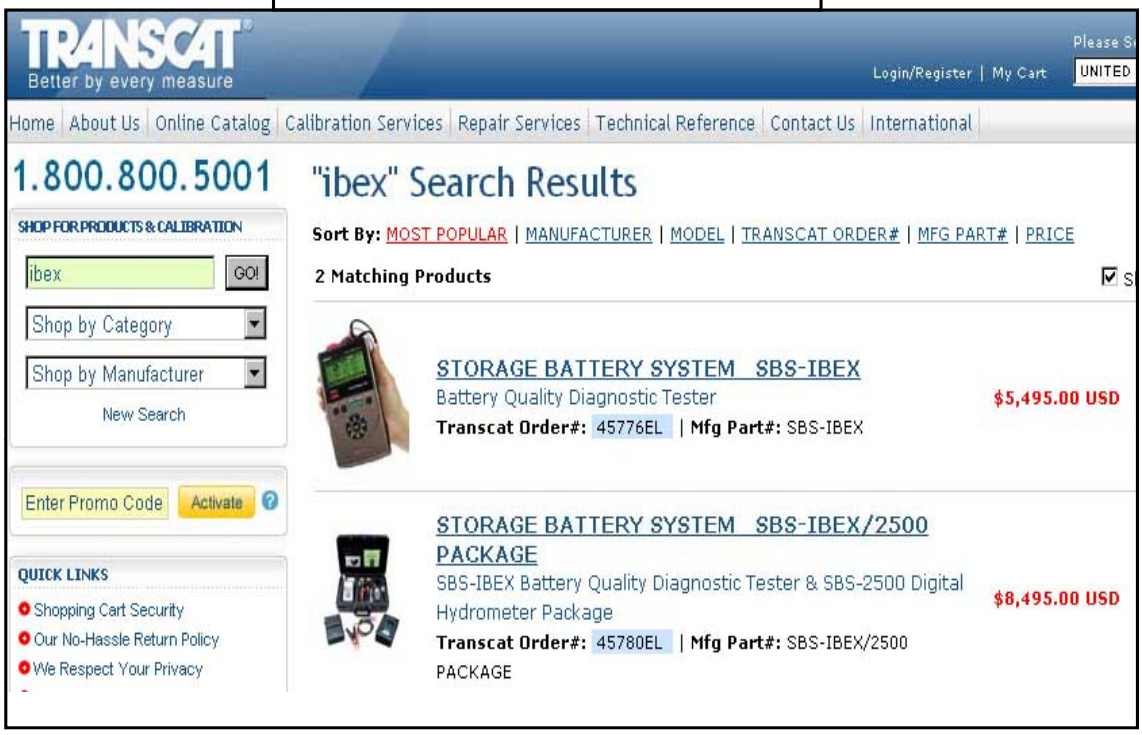
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We Respect Your Privacy
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Sort By: MOST POPULAR | MANUFACTURER | MODEL | TRANSCAT ORDER# | MFG PART# | PRICE
2 Matching Products
STORAGE BATTERY SYSTEM SBS-IBEX
Battery Quality Diagnostic Tester
Transcat Order#: 45776EL | Mfg Part#: SBS-IBEX
$5,495.00 USD
STORAGE BATTERY SYSTEM SBS-IBEX/2500 PACKAGE
SBS-IBEX Battery Quality Diagnostic Tester & SBS-2500 Digital Hydrometer Package
Transcat Order#: 45780EL | Mfg Part#: SBS-IBEX/2500 PACKAGE
$8,495.00 USD

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2-3. Private Labeling Policy

IBEX could be labeled by distributor name, if sales volume reach to 200 units/yr.

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3. iPQMS/BDS, BDS/pro

We manufacture 2 types of Battery Monitoring System (BMS), which has better quality, but it is a reasonable price than other products.

Type	Special Features	Target Customer
iPQMS/BDS	■ is an intelligent Power Quality Monitoring System with battery monitoring system. ■ is a modular type; For example, a 64- jars monitoring is needed 1-MPU and 1-RU, a 448-jars is needed 1-MPU and 7-RU.	Electric (Utility), Internet Data Center, Railroad, Substation, Factory, Building, Etc
BDS/pro	■ is a compact type of Battery Monitoring System assembled in a case. ■ is two types; 24 jars and 48 jars.	Telecom, Mobile, Small UPS, Etc

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(1) Technical Specifications

Our product is satisfied with IEEE Std.1188-1996/2005 “IEEE Recommended for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications.

Type	Technical Specification
iPQMS/BDS	• Automatic measuring; a string voltage, a jar voltage, charging & discharging current, jar internal resistance, and a jar temperature of 10% jars (all is optional). • Measuring speed (1 sec/jar), measuring and storage interval (5 min. to 41 days), interface (RS-232/422/485, TCP/IP) • Monitoring software; display a numerical and graphic bar and is capable of monitoring without specific program because Centroid web2.7 is web based program.
BDS/pro	• As similar as upper.

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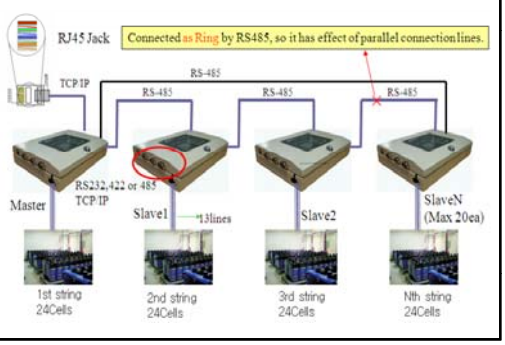
(2) Unit Type and Names

Our product has better quality, moreover a sufficient competitive compared with others

iPQMS/BDS for UPS batteries.	 MPU (Micro Processor Unit) 280*310*90mm	 RU (Relaying Unit) 313*149*90mm
BDS/pro for Telecom batteries.	 BDS (Battery Diagnostic System) 270*230*60mm (World compact size)	

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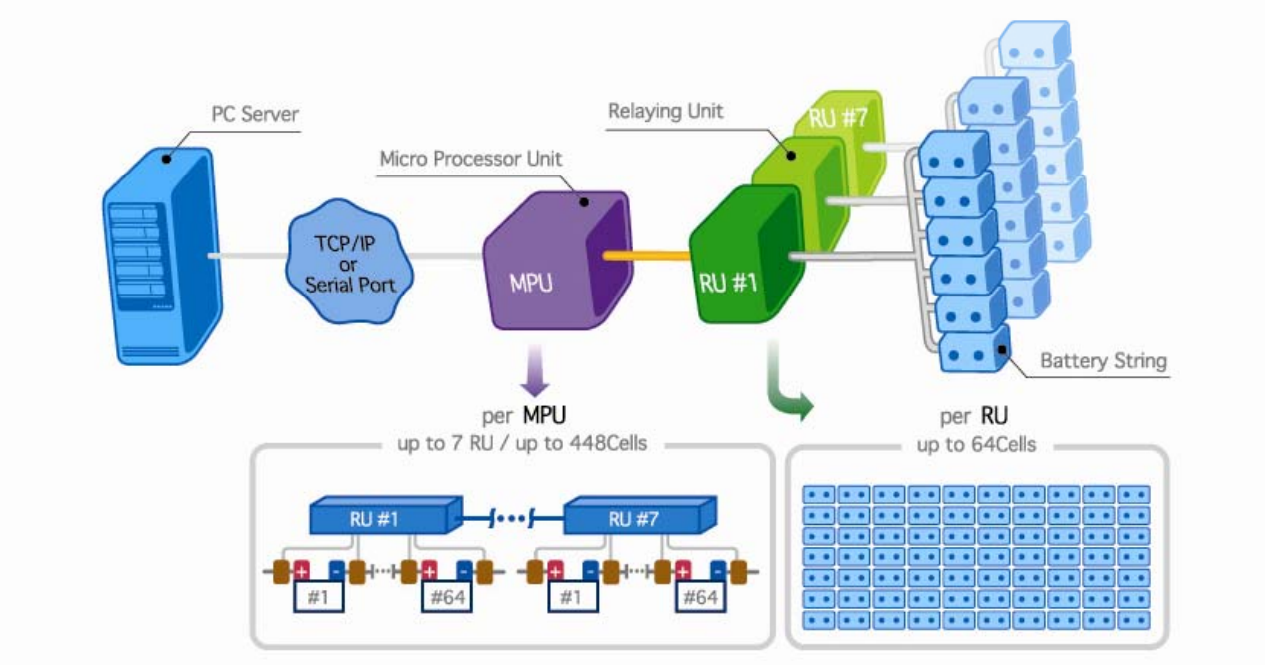
(3) iPQMS/BDS

① Functional Diagram



- 1-RU is capable of relaying (or scanning) 64 jars.
- 1-MPU is capable of measuring 448 jars with 7 RU in max.
- Therefore, a set of iPQMS/**BDS** is capable of 448 jars in max.

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(3) iPQMS/BDS

② Installation View

iPQMS/BDS was installed at Hydro Power Plant.

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(3) iPQMS/BDS ③ Installation View

iPQMS/BDS was installed at Substation.

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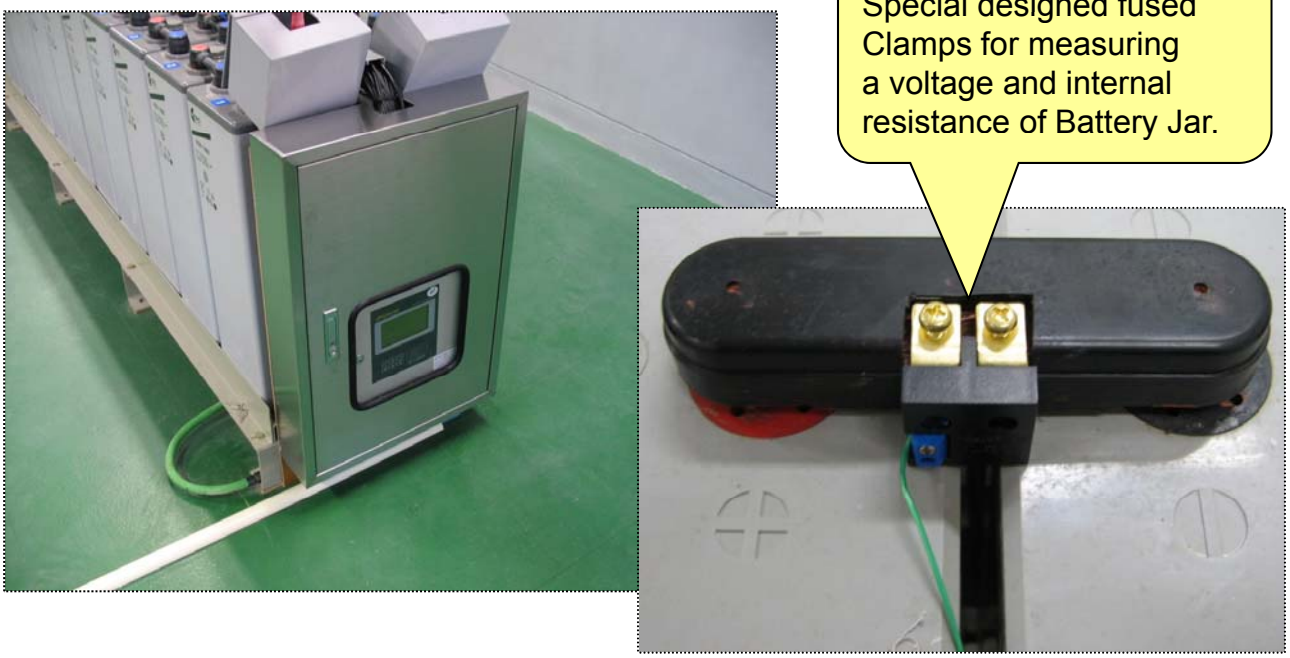
(3) iPQMS/BDS ④ Installation View

iPQMS/BDS was installed at Power Plant.



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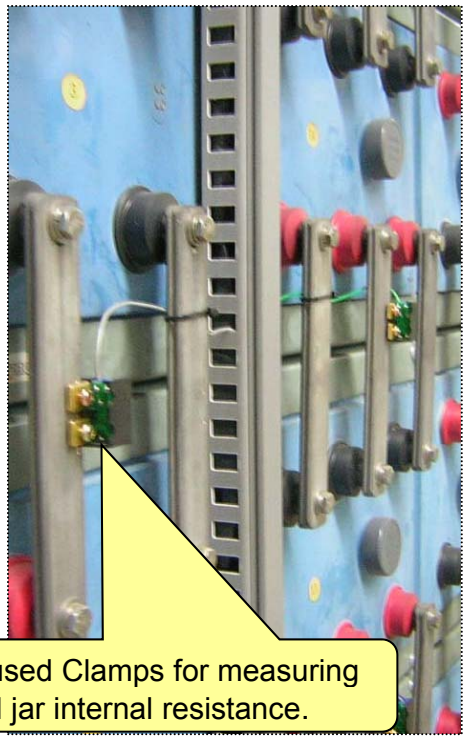
(3) iPQMS/BDS

⑤ Installation View

iPQMS/BDS was installed at Internet Data Center.



Special designed Fused Clamps for measuring a jar voltage and jar internal resistance.

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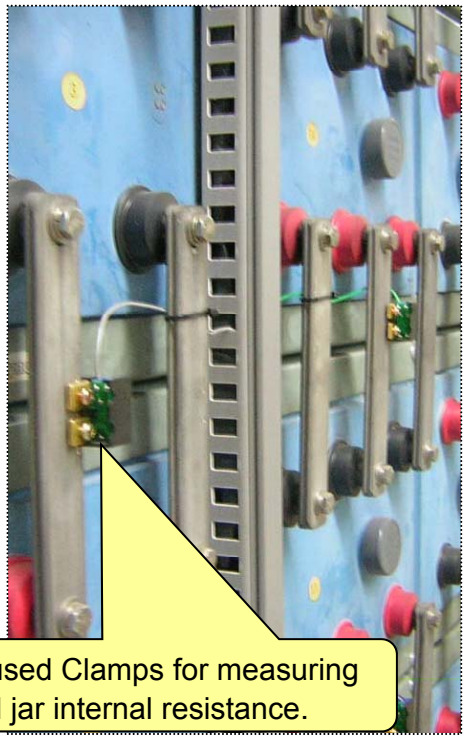
(3) iPQMS/BDS

⑥ Installation View

BDS/pro was installed at Internet Data Center.



Special designed Fused Clamps for measuring a jar voltage and jar internal resistance.

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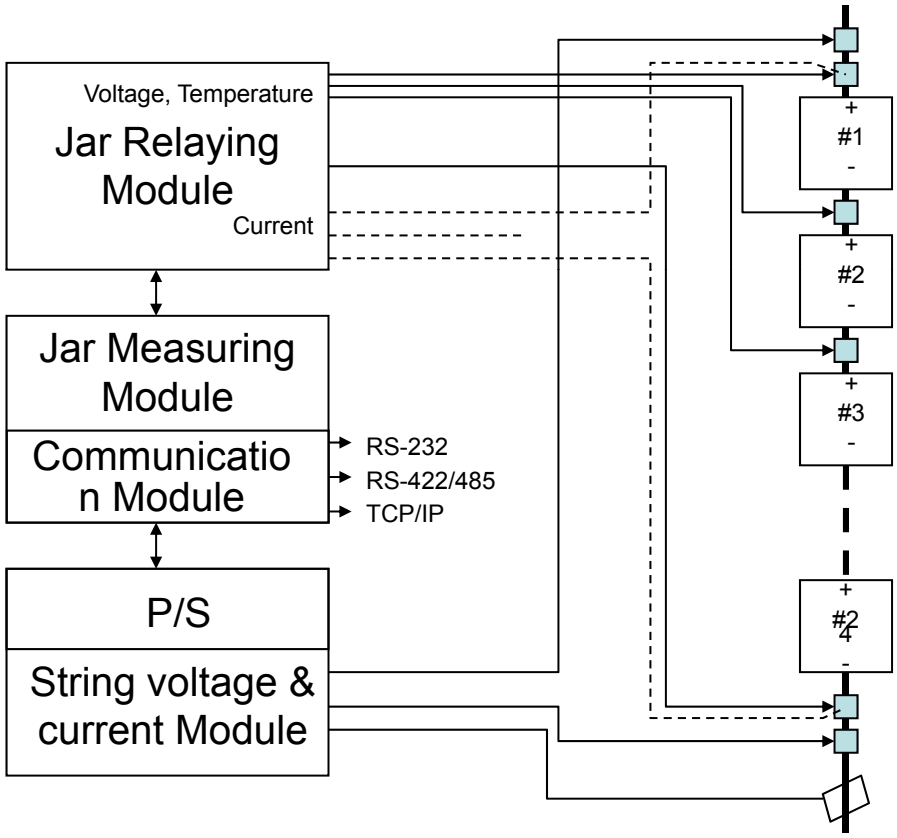
(4) BDS/pro

① Block Diagram



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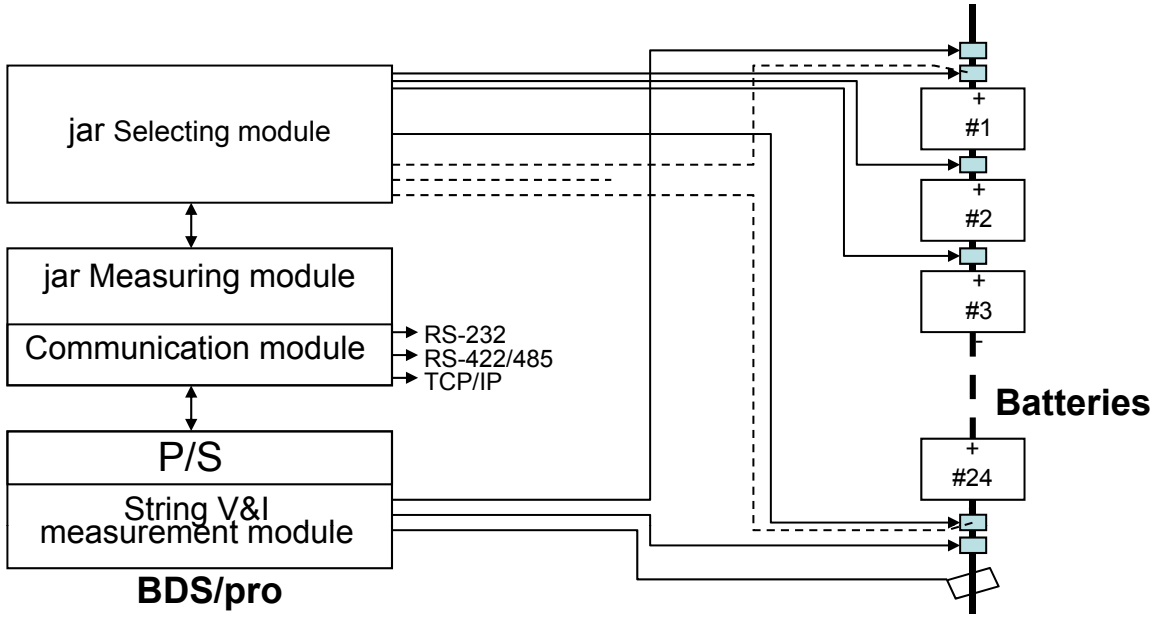
(4) BDS/pro

② Strength



- BDS/pro is compact, because all modules is contained inside one case.
- BDS/pro installation is simple, because of simple wiring & connection.
- BDS/pro operation is easy, because of web-based Software.
- iPQMS/BDS as well as BDS/pro are compact, simple and easy.

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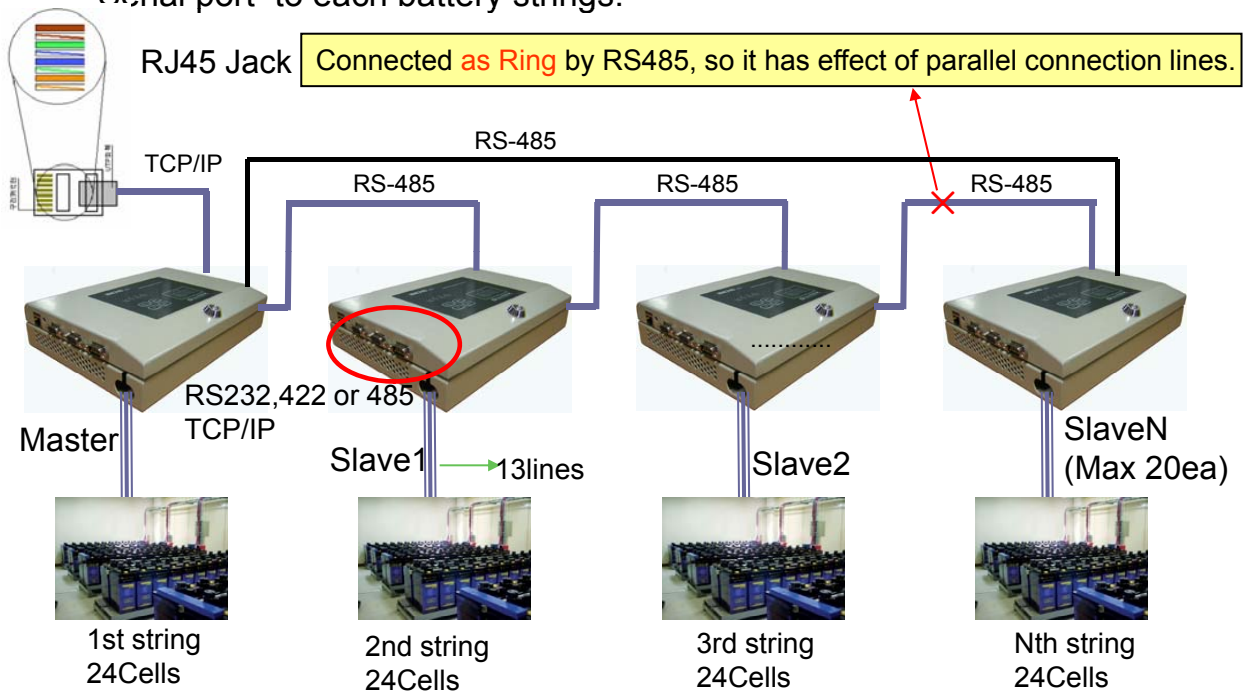
(4) BDS/pro

③ Strength

BDS/pro Network composition for multi communications through RS485 Serial port to each battery strings.



Merit: Each BDS/pro(max 20 sets connection is possible) connected by RS485 communication. This system is ring connected, so even though any RS485 line is disconnected but it does not any effect to communicate with other BDS/pro.

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(4) BDS/pro

④ Strength

Each BDS/pro(max 20 sets connection is possible) connected by RS485 communication.

- **Purpose**

BDS/pro monitors and analyzes the status of stationary battery system such as voltage and current of emergency power supply power lines, charging and discharging DC voltage and current, cell voltage, temperature, internal impedance with the high accuracy in 24 hours of 365 days and TCP/IP environment.

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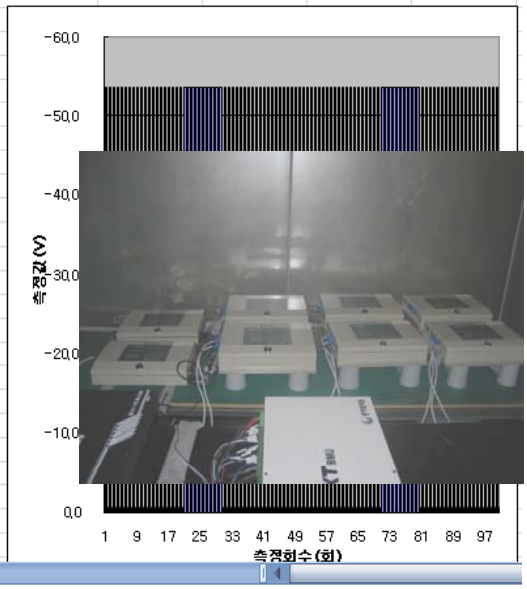
(4) BDS/pro

⑤ Strength

❖ Temp.& humidity chamber Test - 100times

	A	B	C	D	E	F	G	H
1	siteseq	bankno	bankcellno	voltage	imped	reg_date	vdc	idc
2	1,000	1	1	2,246	0,249	12:35:26	-53,7	4,0
3	1,000	1	2	2,246	0,249	12:40:26	-53,7	4,0
4	1,000	1	3	2,247	0,249	12:45:26	-53,7	4,0
5	1,000	1	4	2,246	0,248	12:50:26	-53,7	4,0
6	1,000	1	5	2,246	0,247	12:55:26	-53,7	4,0
7	1,000	1	6	2,247	0,246	1:00:26	-53,7	4,0
8	1,000	1	7	2,246	0,246	1:05:26	-53,7	4,0
9	1,000	1	8	2,246	0,247	1:10:26	-53,7	4,0
10	1,000	1	9	2,246	0,246	1:15:26	-53,7	4,0
11	1,000	1	10	2,246	0,247	1:20:26	-53,7	3,9
12	1,000	1	11	2,247	0,247	1:25:26	-53,7	3,9
13	1,000	1	12	2,247	0,248	1:30:26	-53,7	3,9
14	1,000	1	13	2,246	0,246	1:35:26	-53,7	3,9
15	1,000	1	14	2,246	0,246	1:40:26	-53,7	3,9
16	1,000	1	15	2,246	0,246	1:45:26	-53,7	3,9
17	1,000	1	16	2,246	0,246	1:50:26	-53,7	3,9
18	1,000	1	17	2,246	0,244	1:55:26	-53,7	3,9
19	1,000	1	18	2,247	0,245	2:00:26	-53,7	3,9
20	1,000	1	19	2,246	0,245	2:05:26	-53,7	3,9
21	1,000	1	20	2,246	0,246	2:10:26	-53,7	3,9
22	1,000	1	21	2,247	0,245	2:15:26	-53,7	3,9
23	1,000	1	22	2,246	0,245	2:20:26	-53,7	3,9
24	1,000	1	23	2,246	0,246	2:25:26	-53,7	3,9
25	1,000	1	24	2,246	0,246	2:30:26	-53,7	3,8
26	1,000	1	25	2,246	0,246	2:35:26	-53,7	3,8
27	1,000	1	26	2,246	0,246	2:40:26	-53,7	3,8
28	1,000	1	27	2,247	0,246	2:45:26	-53,7	3,8



뱅크1_1600ah 뱅크2_2000ah 뱅크3_2000ah

Accuracy Cell Voltage; 2.246~2.247(+-0.05%), Internal Ohmic Measurement; 0.244~0.249(less+- 1%)

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(4) BDS/pro

⑥ Installation View

BDS/pro was installed in Network Provider.
Easy to connect battery string with BDS/pro by RS485.

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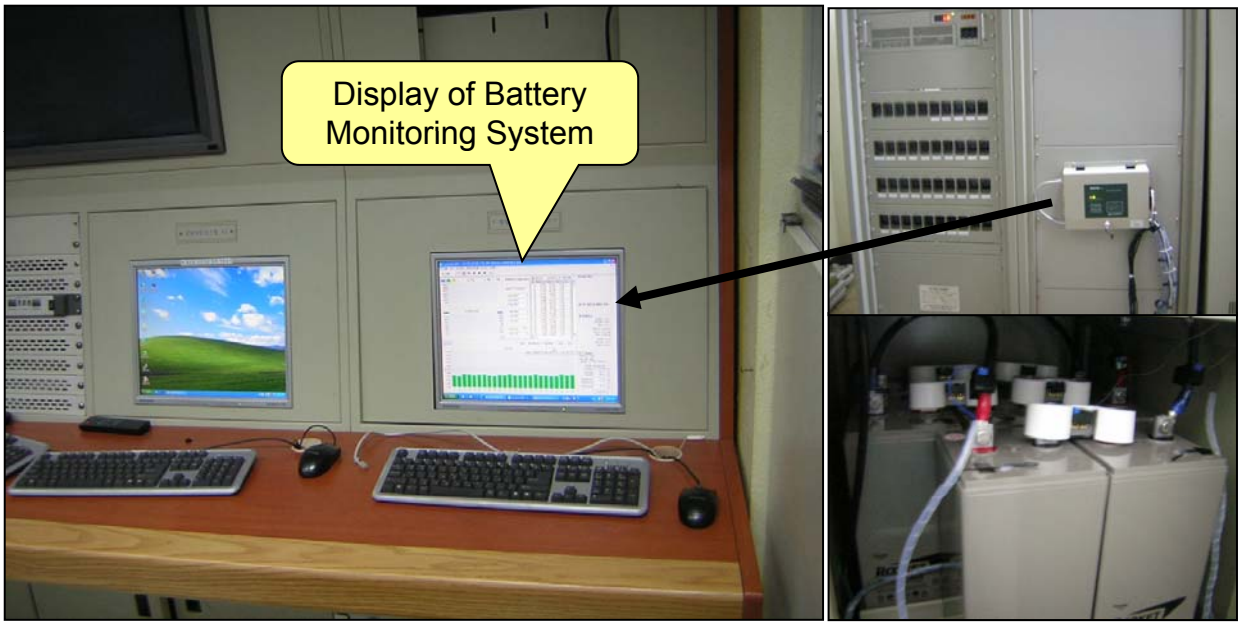
(4) BDS/pro

⑦ Installation View

BDS/pro was installed at the headquarter of Nuclear Power Plant.



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(4) BDS/pro

⑧ Installation View

BDS/pro was installed at Telecom company.

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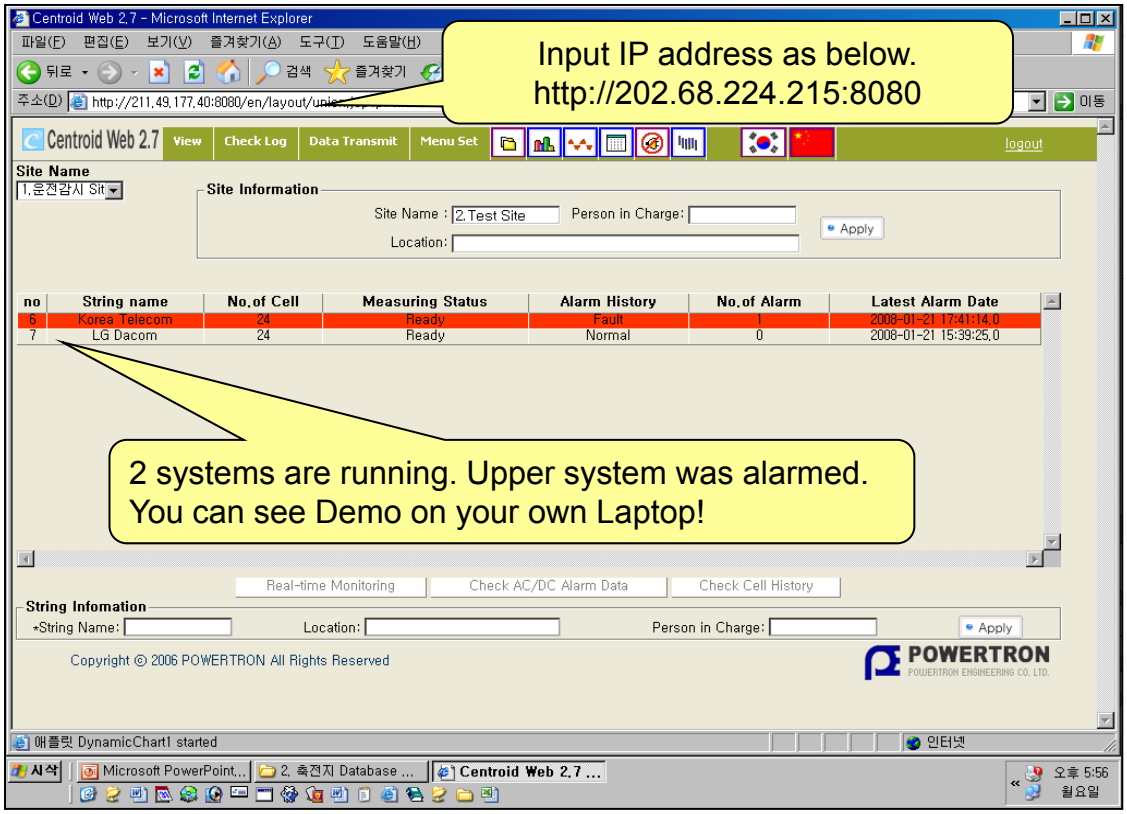
(5) Centroid web 2.7 ① Overall Status



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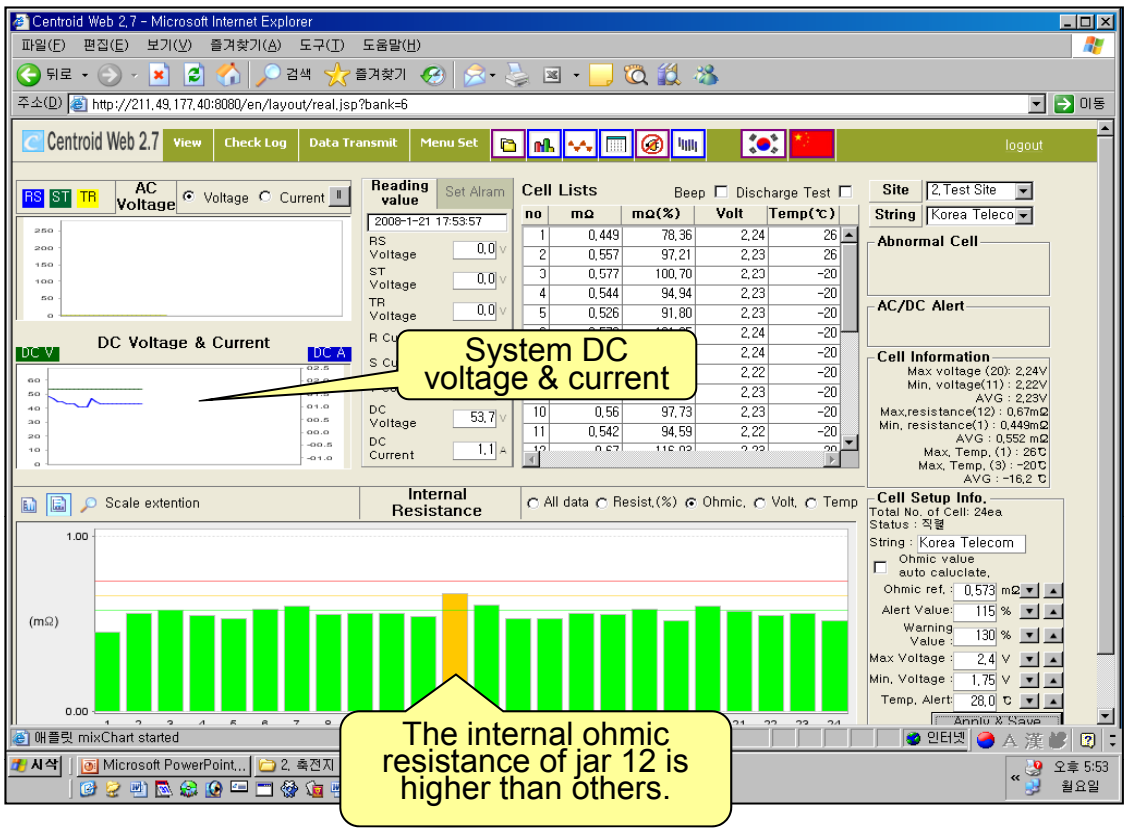
(5) Centroid web 2.7 ② Bar Graph Display



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(6) Ordering Options

Type	Detail Descriptions
iPQMS/BDS for UPS batteries.	 MPU (Micro Processor Unit) RU (Relaying Unit) **(Eg) iPQMS/BDS 192-10** **means 192 jars** **means 100 to 220VAC control power**
BDS/pro for Telecom batteries.	 BDS (Battery Diagnostic System) **(Eg) BDS/pro 24-4** **means 24 jars** **means 48VDC control power**

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If you have any questions, contact us.

E-mail: sales@powertron.co.kr

Phone: 82-2-445-5787(Ext:1)

New Leader in future technology, POWERTRON

Thank you!

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